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NLS2004099
October 25, 2004

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

Subject: License Amendment Request to Revise Technical Specifications - Safety Limit Minimum Critical Power Ratio
Cooper Nuclear Station, Docket 50-298, DPR-46

The purpose of this letter is for the Nebraska Public Power District (NPPD) to request an amendment to Facility Operating License DPR-46 in accordance with the provisions of 10 CFR 50.4 and 10 CFR 50.90 to revise the Cooper Nuclear Station (CNS) Technical Specifications (TS). This proposed TS change will revise dual recirculation loop and single recirculation loop Safety Limit Minimum Critical Power Ratio values to reflect results of a cycle specific calculation.

This change is needed to support Cycle 23 operations. Completion of the Cycle 22 Refueling Outage and startup in Cycle 23 is scheduled for mid February 2005. Therefore, NPPD requests Nuclear Regulatory Commission (NRC) approval of the proposed TS change and issue of the requested license amendment by January 15, 2005. Once approved, the amendment will be implemented within 30 days.

Attachment 1 provides a description of the TS change, the basis for the amendment, the no significant hazards consideration evaluation pursuant to 10 CFR 50.91(a)(1), and the environmental impact evaluation pursuant to 10 CFR 51.22. Attachment 2 provides the specific changes to the current CNS TS on marked up pages. Attachment 3 provides the final, clean typed versions of the affected TS page. Attachment 4, List of Regulatory commitments, reflects that there are no commitments in this submittal. No Bases pages are affected by this amendment request.

The information supporting this proposed change was prepared by Global Nuclear Fuel - Americas (GNF-A) and is considered to be GNF-A proprietary information as described in 10 CFR 2.390(a)(4). The proprietary information is provided as Enclosure 1, with specific proprietary text enclosed within double brackets. It is requested that this information be withheld from public disclosure. The affidavit required by 10 CFR 2.390(b)(1) is provided as Enclosure 2. A nonproprietary version of Enclosure 1 for public disclosure is provided as Enclosure 3.

COOPER NUCLEAR STATION
P.O. Box 98 / Brownville, NE 68321-0098
Telephone: (402) 825-3811 / Fax: (402) 825-5211
www.nppd.com

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This proposed TS change has been reviewed by the necessary safety review committees (Station Operations Review Committee and Safety Review and Audit Board). Amendments to the CNS Facility Operating License through Amendment 207 issued October 15, 2004, have been incorporated into this request. NPPD has concluded that the proposed changes do not involve a significant hazards consideration and that they satisfy the categorical exclusion criteria of 10 CFR 51.22(c).

This request is submitted under oath pursuant to 10 CFR 50.30(b). By copy of this letter and its attachments, the appropriate State of Nebraska official is notified in accordance with 10 CFR 50.91(b)(1). Copies to the NRC Region IV office and the CNS Resident Inspector are also being provided in accordance with 10 CFR 50.4(b)(1).

Should you have any questions concerning this matter, please contact Mr. Paul Fleming at (402) 825-2774.

I declare under penalty of perjury that the foregoing is true and correct.

Executed On: 10/25/04
Date

Sincerely,

Randall K. Edington
Vice President Nuclear and Chief Nuclear Officer

/cb
Attachments
Enclosures

cc: Regional Administrator w/ attachments and enclosures
USNRC - Region IV

Senior Project Manager w/ attachments and enclosures
USNRC - NRR Project Directorate IV-1

Senior Resident Inspector w/ attachments and enclosures
USNRC

Nebraska Health and Human Services w/ attachments and enclosures
Department of Regulation and Licensure

NPG Distribution w/o attachments or enclosures

Records w/ attachments and enclosures

NPPD's Evaluation

License Amendment Request to Revise Technical Specifications
Safety Limit Minimum Critical Power Ratio

Cooper Nuclear Station, NRC Docket 50-298, DPR-46

Revised TS Page

2.0-1

1.0 DESCRIPTION

This letter is a request to amend Operating License (OL) DPR-46 for Cooper Nuclear Station (CNS).

The proposed changes would revise the OL to change the Safety Limit Minimum Critical Power Ratio (SLMCPR) for both two recirculation (dual) loop operation and single recirculation loop operation in Technical Specification (TS) 2.1.1.2 to reflect results of a cycle-specific calculation performed for CNS operation in Cycle 23, using Nuclear Regulatory Commission (NRC) approved methodology. Completion of the Cycle 22 Refueling Outage and startup in Cycle 23 is scheduled for mid February 2005. Therefore, NPPD requests NRC approval of the proposed TS change and issue of the requested license amendment by January 15, 2005. Once approved, the amendment will be implemented within 30 days.

2.0 PROPOSED CHANGE

This license amendment request proposes the following changes:

TS 2.1.1.2 will be revised to change the two recirculation loop MCPR from ≥ 1.09 to ≥ 1.12 and the single recirculation loop MCPR from ≥ 1.11 to ≥ 1.13.

These proposed changes are necessary to reflect cycle specific calculations for CNS Cycle 23 operations.

There are no changes to the associated TS Bases.

3.0 BACKGROUND

The CNS Cycle 23 core has 548 fuel assemblies, consisting of 164 fresh General Electric GE14 fuel bundles and 384 irradiated GE14 fuel bundles. Calculations by Global Nuclear Fuels - Americas (GNF-A) for the CNS Cycle 23 SLMCPR values are based on NRC approved methods and procedures.

4.0 TECHNICAL ANALYSIS

The safety design basis provided in the Updated Safety Analysis Report (USAR) (USAR III-7) is that the thermal hydraulic design of the core shall establish a thermal hydraulic safety limit for use in evaluating the safety margin relating the consequences of fuel barrier failure to public safety. To ensure that adequate margin is maintained, a design requirement based on a statistical analysis was selected as follows. Moderate frequency transients caused by a single operator

error or equipment malfunction shall be limited such that, considering uncertainties in manufacturing and monitoring the core operating state, at least 99.9% of the fuel rods would be expected to avoid boiling transition. The lowest allowable transient minimum critical power ratio (MCPR) limit which meets the design requirement is termed the fuel cladding integrity SLMCPR.

A plant unique operating limit MCPR is established to provide adequate assurance that the fuel cladding integrity SLMCPR is not exceeded for any anticipated operational transients. The operating limit MCPR is obtained by adding the maximum delta critical power ratio (CPR) value for the most limiting transient postulated to occur at the plant to the fuel cladding integrity SLMCPR. Cycle specific delta critical power ratio values are determined as part of the reload analysis and are reported in the Supplemental Reload Licensing Report.

Analyses have been performed which show that at least 99.9% of the fuel rods in the core are expected to avoid boiling transition (and, therefore, cladding damage due to overheating) if the MCPR is equal to or greater than the fuel cladding integrity SLMCPR.

5.0 REGULATORY SAFETY ANALYSIS

As part of a reload core design, cycle specific transient analyses are performed to determine the required SLMCPR and the delta CPR for specific transients. Enclosure 1, "Additional Information Regarding the Cycle Specific SLMCPR for Cooper Nuclear Station Cycle 23", compares the SLMCPR value for Cycle 23 with the SLMCPR value for the current operating cycle, Cycle 22. Enclosure 1 documents that the SLMCPR evaluations were performed using NRC approved methods and uncertainties. Included is supporting information that documents prior communications by GNF-A to the NRC that deal with NRC questions pertaining to how GE14 applications satisfy the conditions of the NRC SER accepting GNF-A methods and uncertainties, generically applicable questions related to application of the GEXL14 correlation and the applicable range for the R-factor methodology. This enclosure also provides the core loading information for CNS Cycle 22 and 23.

By using the sum of the maximum delta CPR and cycle specific SLMCPR to determine operating limit MCPR, compliance with General Design Criteria 10, Reactor Design, is preserved.

5.1 No Significant Hazards Consideration

10 CFR 50.91(a)(1) requires that licensee requests for operating license amendments be accompanied by an evaluation of significant hazard posed by issuance of an

amendment. Nebraska Public Power District (NPPD) has evaluated this proposed amendment with respect to the criteria given in 10 CFR 50.92 (c).

The proposed changes would revise the Cooper Nuclear Station (CNS) Operating License to increase the values of the Safety Limit Minimum Critical Power Ratio (SLMCPR) for both two recirculation (dual) loop operation and single recirculation loop operation in Technical Specification 2.1.1.2. The changes reflect results of a cycle specific calculation performed for Cooper Nuclear Station Cycle 23 operation, using Nuclear Regulatory Commission (NRC) approved methodology.

1. Do the proposed changes involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No

   The probability of an evaluated accident is derived from the probabilities of the individual precursors to that accident. Changing the SLMCPR does not increase the probability of an evaluated accident. The change does not require any physical plant modifications, physically affect any plant components, or entail changes in plant operation. Therefore, no individual precursors of an accident are affected.

   The consequences of an evaluated accident are determined by the operability of plant systems designed to mitigate those consequences. Limits have been established, consistent with NRC approved methods, to ensure that fuel performance during normal, transient, and accident conditions is acceptable. The proposed change conservatively establishes the safety limit for the minimum critical power ratio (SLMCPR) for Cooper Nuclear Station Cycle 23 such that the fuel is protected during normal operation and during any plant transients or anticipated operational occurrences.

   The proposed change revises the SLMCPR to protect the fuel during normal operation as well as during any transients or anticipated operational occurrences. Operational limits Minimum Critical Power Ratio (MCPR) are established based on the proposed SLMCPR to ensure that the SLMCPR is not violated during all modes of operation. This will ensure that the fuel design safety criteria (i.e., that at least 99.9% of the fuel rods do not experience transition boiling during normal operation and anticipated operational occurrences) is met. Since the operability of plant systems designed to mitigate

any consequences of accidents has not changed, the consequences of an accident previously evaluated are not expected to increase.

Based on the above NPPD concludes that the proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Do the proposed changes create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No

Creation of the possibility of a new or different kind of accident would require the creation of one or more new precursors of that accident. New accident precursors may be created by modifications of the plant configuration or changes in allowable modes of operation. The proposed change does not involve any modifications of the plant configuration or allowable modes of operation. The proposed change to the SLMCPR assures that safety criteria are maintained for Cycle 23.

Based on the above NPPD concludes that the proposed changes do not create the possibility of a new or different kind of accident from any previously evaluated.

3. Do the proposed changes involve a significant reduction in a margin of safety?

Response: No

The value of the proposed SLMCPR provides a margin of safety by ensuring that no more than 0.1% of the rods are expected to be in boiling transition if the MCPR limit is not violated. The proposed change will ensure the appropriate level of fuel protection is maintained. Additionally, operational limits are established based on the proposed SLMCPR to ensure that the SLMCPR is not violated during all modes of operation. This will ensure that the fuel design safety criteria (i.e., that at least 99.9% of the fuel rods do not experience transition boiling during normal operation as well as anticipated operational occurrences) are met.

Based on the above NPPD concludes that the proposed changes do not involve a significant reduction in a margin of safety.

From the above discussions, NPPD concludes that the proposed amendment involves no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

5.2 Applicable Regulatory Requirements/Criteria

10 CFR 50 Appendix A Criterion 10 - Reactor Design

The reactor core and associated coolant, control, and protection systems shall be designed with appropriate margin to assure that specified acceptable fuel design limits are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences. The fuel cladding must not sustain damage as a result of normal operation and abnormal operational transients. The reactor core safety limits are established to preclude violation of the fuel design criterion that a SLMCPR is to be established, such that at least 99.9% of the fuel rods in the core would not be expected to experience the onset of transition boiling.

6.0 ENVIRONMENTAL CONSIDERATION

10 CFR 51.22(c)(9) provides criteria for, and identification of, licensing and regulatory actions eligible for categorical exclusion from performing an environmental assessment. A proposed amendment to an operating license for a facility does not require an environmental assessment if operation of the facility in accordance with the proposed amendment would not: (1) involve a significant hazards consideration, (2) result in a significant change in the types or significant increase in the amount of any effluents that may be released off-site, or (3) result in an increase in individual or cumulative occupational radiation exposure. NPPD has reviewed the proposed license amendment and concludes that it meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(c), no environmental impact statement or environmental assessment needs to be prepared in connection with issuance of the proposed license changes. The basis for this determination is as follows:

1. The proposed license amendment does not involve significant hazards as described previously in the No Significant Hazards Consideration Evaluation.

2. This proposed change does not result in a significant change in the types or significant increase in the amounts of any effluents that may be released off-site. The proposed license amendment does not introduce any new equipment, nor does it require any existing equipment or systems to perform a different type of function than they are presently designed to perform. NPPD has concluded that there will not be a significant

increase in the types or amounts of any effluents that may be released off-site and these changes do not involve irreversible environmental consequences beyond those already associated with normal operation.

3. These changes do not adversely affect plant systems or operation and therefore, do not significantly increase individual or cumulative occupational radiation exposure beyond that already associated with normal operation.

7.0 REFERENCES

Similar amendments have been granted by the NRC for (not all inclusive):

1. Vermont Yankee Nuclear Power Station, Docket No. 50-271, License No. DPR-28, Amendment 217, dated March 22, 2004.
2. Quad Cities Nuclear Power Station, Unit 2, Docket No. 50-265, License No. DPR-30, Amendment 215, dated March 10, 2004.
3. Brunswick Steam Electric Plant, Unit 1, Docket No. 50-325, License No. DPR-71, Amendment 231, dated March 26, 2004.

None of these are identical to this request, in that none of the core designs is exactly like the CNS Cycle 23 core design. The CNS Cycle 23 core design uses a complete core of GE14 fuel. Each of the referenced amendments was for a mixed core design using GE14 fuel with some other fuel type(s). Each was reviewed for applicability of methods, uncertainties and the GEXL14 correlation. Each was determined to not involve a significant hazards consideration and was approved by the NRC.

A similar amendment request is currently being reviewed by the NRC.

4. James A. Fitzpatrick Nuclear Power Plant, Docket No. 50-333, License No. DPR-59, Proposed Amendment Request dated June 4, 2004.

This reference is included due to similar issues involving a recent GNF Part 21 report (Event Number 40982).

ATTACHMENT 2

PROPOSED TECHNICAL SPECIFICATIONS REVISIONS
MARKUP FORMAT

COOPER NUCLEAR STATION
NRC DOCKET 50-298, LICENSE DPR-46

Listing of Revised Pages

TS Pages

2.0-1

2.0 SAFETY LIMITS (SLs)

2.1 SLs

2.1.1 Reactor Core SLs

2.1.1.1 With the reactor steam dome pressure < 785 psig or core flow < 10% rated core flow:

THERMAL POWER shall be ≤ 25% RTP.

2.1.1.2 With the reactor steam dome pressure ≥ 785 psig and core flow ≥ 10% rated core flow:

MCPR shall be ≥ 1.12 for two recirculation loop operation or ≥ 1.13 for single recirculation loop operation.

2.1.1.3 Reactor vessel water level shall be greater than the top of active irradiated fuel.

2.1.2 Reactor Coolant System Pressure SL

Reactor steam dome pressure shall be ≤ 1337 psig.

2.2 SL Violations

With any SL violation, the following actions shall be completed within 2 hours:

2.2.1 Restore compliance with all SLs; and

2.2.2 Insert all insertable control rods.

ATTACHMENT 3

PROPOSED TECHNICAL SPECIFICATIONS REVISIONS
FINAL TYPED FORMAT

COOPER NUCLEAR STATION
NRC DOCKET 50-298, LICENSE DPR-46

Listing of Revised Pages

TS Pages

2.0-1

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ATTACHMENT 4

LIST OF REGULATORY COMMITMENTS

COOPER NUCLEAR STATION
NRC DOCKET 50-298, LICENSE DPR-46

Correspondence Number: NLS2004099

The following table identifies those actions committed to by Nebraska Public Power District (NPPD) in this document. Any other actions discussed in the submittal represent intended or planned actions by NPPD. They are described for information only and are not regulatory commitments. Please notify the Licensing & Regulatory Affairs Manager at Cooper Nuclear Station of any questions regarding this document or any associated regulatory commitments.

COMMITMENT	COMMITTED DATE OR OUTAGE
None	

ENCLOSURE 2

AFFIDAVIT

COOPER NUCLEAR STATION
NRC DOCKET 50-298, LICENSE DPR-46

Affidavit

I, Margaret E. Harding, state as follows:

(1) I am Manager, Fuel Engineering Services, Global Nuclear Fuel – Americas, L.L.C. ("GNF-A") and have been delegated the function of reviewing the information described in paragraph (2) which is sought to be withheld, and have been authorized to apply for its withholding.

(2) The information sought to be withheld is contained in the attachment, "Additional Information Regarding the Cycle Specific SLMCPR for Cooper Nuclear Station Cycle 23" September 22, 2004. GNF proprietary information is indicated by enclosing it in double brackets. In each case, the superscript notation {3} refers to Paragraph (3) of this affidavit, which provides the basis for the proprietary determination.

(3) In making this application for withholding of proprietary information of which it is the owner or licensee, GNF-A relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOIA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR 9.17(a)(4) and 2.390(a)(4) for "trade secrets and commercial or financial information obtained from a person and privileged or confidential" (Exemption 4). The material for which exemption from disclosure is here sought is all "confidential commercial information," and some portions also qualify under the narrower definition of "trade secret," within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d1280 (DC Cir. 1983).

(4) Some examples of categories of information which fit into the definition of proprietary information are:

a. Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by GNF-A's competitors without license from GNF-A constitutes a competitive economic advantage over other companies;

b. Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product;

c. Information which reveals cost or price information, production capacities, budget levels, or commercial strategies of GNF-A, its customers, or its suppliers;

d. Information which reveals aspects of past, present, or future GNF-A customer–funded development plans and programs, of potential commercial value to GNF-A;

e. Information which discloses patentable subject matter for which it may be desirable to obtain patent protection.

The information sought to be withheld is considered to be proprietary for the reasons set forth in paragraphs (4)a. and (4)b., above.

(5) To address the 10 CFR 2.390 (b) (4), the information sought to be withheld is being submitted to NRC in confidence. The information is of a sort customarily held in confidence by GNF-A, and is in fact so held. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in (6) and (7) following. The information sought to be withheld has, to the best of my knowledge and belief, consistently been held in confidence by GNF-A, no public disclosure has been made, and it is not available in public sources. All disclosures to third parties including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence.

(6) Initial approval of proprietary treatment of a document is made by the manager of the originating component, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge, or subject to the terms under which it was licensed to GNF-A. Access to such documents within GNF-A is limited on a "need to know" basis.

(7) The procedure for approval of external release of such a document typically requires review by the staff manager, project manager, principal scientist or other equivalent authority, by the manager of the cognizant marketing function (or his delegate), and by the Legal Operation, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside GNF-A are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.

(8) The information identified in paragraph (2) is classified as proprietary because it contains details of GNF-A's fuel design and licensing methodology.

The development of the methods used in these analyses, along with the testing, development and approval of the supporting methodology was achieved at a significant cost, on the order of several million dollars, to GNF-A or its licensor.

(9) Public disclosure of the information sought to be withheld is likely to cause substantial harm to GNF-A's competitive position and foreclose or reduce the availability of profit–making opportunities. The fuel design and licensing methodology is part of GNF-A's comprehensive BWR safety and technology base, and its commercial value extends beyond the original development cost. The value of the technology base goes beyond the extensive physical database and analytical methodology and includes development of the expertise to determine and apply the appropriate evaluation process. In addition, the technology base includes the value derived from providing analyses done with NRC–approved methods.

The research, development, engineering, analytical, and NRC review costs comprise a substantial investment of time and money by GNF-A or its licensor.

The precise value of the expertise to devise an evaluation process and apply the correct analytical methodology is difficult to quantify, but it clearly is substantial.

GNF-A's competitive advantage will be lost if its competitors are able to use the results of the GNF-A experience to normalize or verify their own process or if they are able to claim an equivalent understanding by demonstrating that they can arrive at the same or similar conclusions.

The value of this information to GNF-A would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive GNF-A of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment in developing and obtaining these very valuable analytical tools.

I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.

Executed at Wilmington, North Carolina, this 22nd day of September, 2004.

Margaret E. Harding

Margaret E. Harding
Global Nuclear Fuel – Americas, LLC

ENCLOSURE 3

ADDITIONAL INFORMATION REGARDING THE
CYCLE SPECIFIC SLMCPR FOR COOPER NUCLEAR STATION CYCLE 23

NON-PROPRIETARY VERSION

COOPER NUCLEAR STATION
NRC DOCKET 50-298, LICENSE DPR-46

Attachment **Additional Information Regarding the Cycle Specific SLMCPR for Cooper Nuclear Station Cycle 23** **September 22, 2004**

Proprietary Information Notice

This document is the GNF non-proprietary version of the GNF proprietary report. From the GNF proprietary version, the information denoted as GNF proprietary (enclosed in double brackets) was deleted to generate this version.

References

[1] Letter, Frank Akstulewicz (NRC) to Glen A. Watford (GE), "Acceptance for Referencing of Licensing Topical Reports NEDC-32601P, Methodology and Uncertainties for Safety Limit MCPR Evaluations; NEDC-32694P, Power Distribution Uncertainties for Safety Limit MCPR Evaluation; and Amendment 25 to NEDE-24011-P-A on Cycle Specific Safety Limit MCPR," (TAC Nos. M97490, M99069 and M97491), March 11, 1999.

[2] Letter, Thomas H. Essig (NRC) to Glen A. Watford (GE), "Acceptance for Referencing of Licensing Topical Report NEDC-32505P, Revision 1, R-Factor Calculation Method for GE11, GE12 and GE13 Fuel," (TAC Nos. M99070 and M95081), January 11, 1999.

[3] General Electric BWR Thermal Analysis Basis (GETAB): Data, Correlation and Design Application, NEDO-10958-A, January 1977.

[4] Letter, Glen A. Watford (GNF-A) to U. S. Nuclear Regulatory Commission Document Control Desk with attention to R. Pulsifer (NRC), "Confirmation of 10x10 Fuel Design Applicability to Improved SLMCPR, Power Distribution and R-Factor Methodologies", FLN-2001-016, September 24, 2001.

[5] Letter, Glen A. Watford (GNF-A) to U. S. Nuclear Regulatory Commission Document Control Desk with attention to J. Donoghue (NRC), "Confirmation of the Applicability of the GEXL14 Correlation and Associated R-Factor Methodology for Calculating SLMCPR Values in Cores Containing GE14 Fuel", FLN-2001-017, October 1, 2001.

[6] Letter, Jason S. Post (GE Energy) to U.S. Nuclear Regulatrory Commission Document Control Desk, "Part 21 Reportable Condition and 60-Day Interim Report Notification: Non-conservative SLMCPR", MFN-04-081, August 24, 2004.

[7] Letter, Glen A. Watford (GNF-A) to U. S. Nuclear Regulatory Commission Document Control Desk with attention to J. Donoghue (NRC), "Final Presentation Material for GEXL Presentation – February 11, 2002", FLN-2002-004, February 12, 2002.

Discussion

The Safety Limit Minimum Critical Power Ratio (SLMCPR) evaluations for the Cooper Nuclear Station Cycle 23 were performed using NRC approved methodology and uncertainties [1]. Table 1 summarizes the relevant input parameters and results of Cycle 23 and Cycle 22 cores. Additional information is provided in response to NRC questions related to similar submittals regarding changes in Technical Specification values of SLMCPR. NRC questions pertaining to how GE14 applications satisfy the conditions of the NRC SER[1] have been addressed in Reference [4]. Other generically applicable questions related to application of the GEXL14 correlation, and to the applicable range for the R-factor methodology, are addressed in Reference [5]. Items that require a plant/cycle specific response are presented below.

Evaluations for BWR plants fueled by GNF fuel bundle designs determined that limiting control blade patterns developed for less than rated flow at rated power condition sometimes yield more limiting bundle-by-bundle MCPR distributions and/or more limiting bundle axial power shapes than the limiting control blade patterns developed for a rated flow/rated power SLMCPR evaluation, as reported in Reference [6]. Therefore, to conservatively account for operation at lower flow / rated power conditions, SLMCPR evaluations were also performed at the lowest core flow rate (75% rated flow) at rated power condition for the same Cooper Cycle 22 and 23 exposure points that were used for the rated flow/rated power evaluations.

In general, the calculated safety limit is dominated by two key parameters: (1) flatness of the core bundle-by-bundle MCPR distributions, and (2) flatness of the bundle pin-by-pin power/R-factor distributions. Greater flatness in either parameter yields more rods susceptible to boiling transition and thus a higher calculated SLMCPR. The impact of these parameters on the Cooper Nuclear Station Cycle 23 and Cycle 22 SLMCPR values is summarized in Table 1.

The core loading information for Cooper Nuclear Station Cycle 22 is provided in Figure 1. For comparison the core loading information for Cooper Nuclear Station Cycle 23 is provided in Figure 2. The impact of the fuel loading pattern differences on the calculated SLMCPR is correlated to the values of [[

]]

[[

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The uncontrolled bundle pin-by-pin power distributions were compared between the Cooper Nuclear Station Cycle 23 bundles and the Cycle 22 bundles. Pin-by-pin power distributions are characterized in terms of R-factors using the NRC approved methodology [2]. For the Cooper Nuclear Station Cycle 23 limiting case analyzed at EOC, [[

[1] EOC is used to denote a cycle exposure prior to the End of Rated (EOR) Flow/Rated Power cycle exposure point where the core is critical with control blades inserted to place the core on the MCPR operating limits. This cycle exposure point usually occurs between 1000 - 2000 MWd/ST prior to the EOR cycle exposure point.

]] the Cooper Nuclear Station Cycle 23 bundles have a flatter power distribution than the bundles used for the Cycle 22 SLMCPR analysis.

Table 1 summarizes the relevant input parameters and results of Cycle 23 evaluated at the limiting condition of 75% rated flow/100% rated power and Cycle 22 evaluated at both rated flow/rated power and 75% rated flow/100% rated power for comparison. The SLMCPR values were calculated for Cooper using uncertainties that have been previously reviewed and approved by the NRC as listed in Table 2a and described in Reference [1] and where warranted, higher plant-cycle-specific uncertainties as listed in Table 2b. In addition to using a larger uncertainty for the GEXL R-factor to account for increased channel bow consistent with current GNF fuel operation, for the lower flow evaluations the Core Flow Rate and Random effective TIP reading uncertainties were increased by the inverse of the core flow fraction to conservatively account for an increase in relative uncertainty that may occur as core flow decreases. Although justification may exist to continue to use the same uncertainties at lower flow as are specified for rated flow in the current GNF SLMCPR methodology, no such credit was taken for the Cooper low flow Cycle 22 and Cycle 23 SLMCPR evaluations.

These calculations use the GEXL14 correlation for GE14 fuel. [[

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Table 3 provides a detailed breakdown into individual components of the SLMCPR for Cycle 22 and Cycle 23 evaluations and compares the summation of components to the calculated SLMCPR values. Estimated component values were based upon the magnitudes of components that were calculated by separate Monte Carlo analyses. The components were added to base SLMCPR values that were calculated using a correlation that estimates SLMCPR values [[ ]], hence forward in this discussion referred to as "the correlation". Using the correlation for Cooper core conditions under estimates the Monte Carlo calculated SLMCPR values for Cycle 22 and over estimates the Monte Carlo calculated SLMCPR values for Cycle 23. [[

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For single loop operation (SLO) the calculated safety limit MCPR for the limiting case is 1.13 as determined by specific calculations for Cooper Nuclear Station Cycle 23 at EOC. The dual loop operation (DLO) and SLO SLMCPR values calculated for Cooper Nuclear Station Cycle 23 are shown in Table 1.

Summary

The calculated 1.12 DLO SLMCPR and 1.13 SLO SLMCPR for Cooper Nuclear Station Cycle 23 are consistent with expectations [[

]] these values are appropriate when the approved methodology is used.

Based on the information and discussion presented above, it is concluded that the calculated SLMCPR of 1.12 for DLO and 1.13 for SLO are appropriate for the Cooper Nuclear Station Cycle 23 core.

Table 1

Comparison of the Cooper Nuclear Station Cycle 22 and Cycle 23 SLMCPR

QUANTITY, DESCRIPTION	Cooper Nuclear Station Cycle 22	Cooper Nuclear Station Cycle 22	Cooper Nuclear Station Cycle 23
Number of Bundles in Core	548	548	548
Limiting Cycle Exposure Point	EOC	EOC	EOC
Cycle Exposure at Limiting Point (MWd/ST)	9975	9700	11000
% Rated Flow	100	75	75
Reload Fuel Type	GE14	GE14	GE14
Latest Reload Batch Fraction, %	23.4	23.4	29.9
Latest Reload Average Batch Weight % Enrichment	3.95	3.95	3.94
Core Fuel Fraction for GE14 (%)	70.1	70.1	100.0
Core Fuel Fraction for GE9B (%)	29.9	29.9	0.0
Core Average Weight % Enrichment	3.75	3.75	3.89
Core MCPR (for limiting rod pattern)	1.46	1.46	1.45
[[			]]
[[			]]
[[			]]
Power distribution methodology	GETAB NEDO-10958-A	Revised NEDC-32601P-A	GETAB NEDO-10958-A
Power distribution uncertainty	GETAB NEDO-10958-A	Reduced NEDC-32694P-A	GETAB NEDO-10958-A
Non-power distribution uncertainty	Revised NEDC-32601P-A	Revised NEDC-32601P-A	Revised NEDC-32601P-A
Calculated Safety Limit MCPR (DLO)	**1.09**	**1.10**	**1.12**
Calculated Safety Limit MCPR (SLO)	**1.11**	**1.12**	**1.13**

Table 2a

Standard Uncertainties

DESCRIPTION	Cooper Nuclear Station Cycle 22	Cooper Nuclear Station Cycle 22	Cooper Nuclear Station Cycle 23
Non-power Distribution Uncertainties	Revised NEDC-32601P-A	Revised NEDC-32601P-A	Revised NEDC-32601P-A
Core flow rate (derived from pressure drop)	2.5 DLO 6.0 SLO	2.5 DLO 6.0 SLO	2.5 DLO 6.0 SLO
Individual channel flow area	[[ ]]	[[ ]]	[[ ]]
Individual channel friction factor	5.0	5.0	5.0
Friction factor multiplier	[[ ]]	[[ ]]	[[ ]]
Reactor pressure	[[ ]]	[[ ]]	[[ ]]
Core inlet temperature	0.2	0.2	0.2
Feedwater temperature	[[ ]]	[[ ]]	[[ ]]
Feedwater flow rate	[[ ]]	[[ ]]	[[ ]]
Power Distribution Uncertainties	GETAB NEDC-32601P-A	Reduced NEDC-32694P-A	GETAB NEDC-32601P-A
GEXL R-factor	[[ ]]	[[ ]]	[[ ]]
Random effective TIP reading	1.2 DLO 2.85 SLO	1.2 DLO 2.85 SLO	1.2 DLO 2.85 SLO
Systematic effective TIP reading	8.6	[[ ]]	8.6
Integrated effective TIP reading	N/A	[[ ]]	N/A
Bundle power	N/A	[[ ]]	N/A
Effective total bundle power uncertainty	4.3	[[ ]]	4.3

Table 2b

Exceptions to the Standard Uncertainties

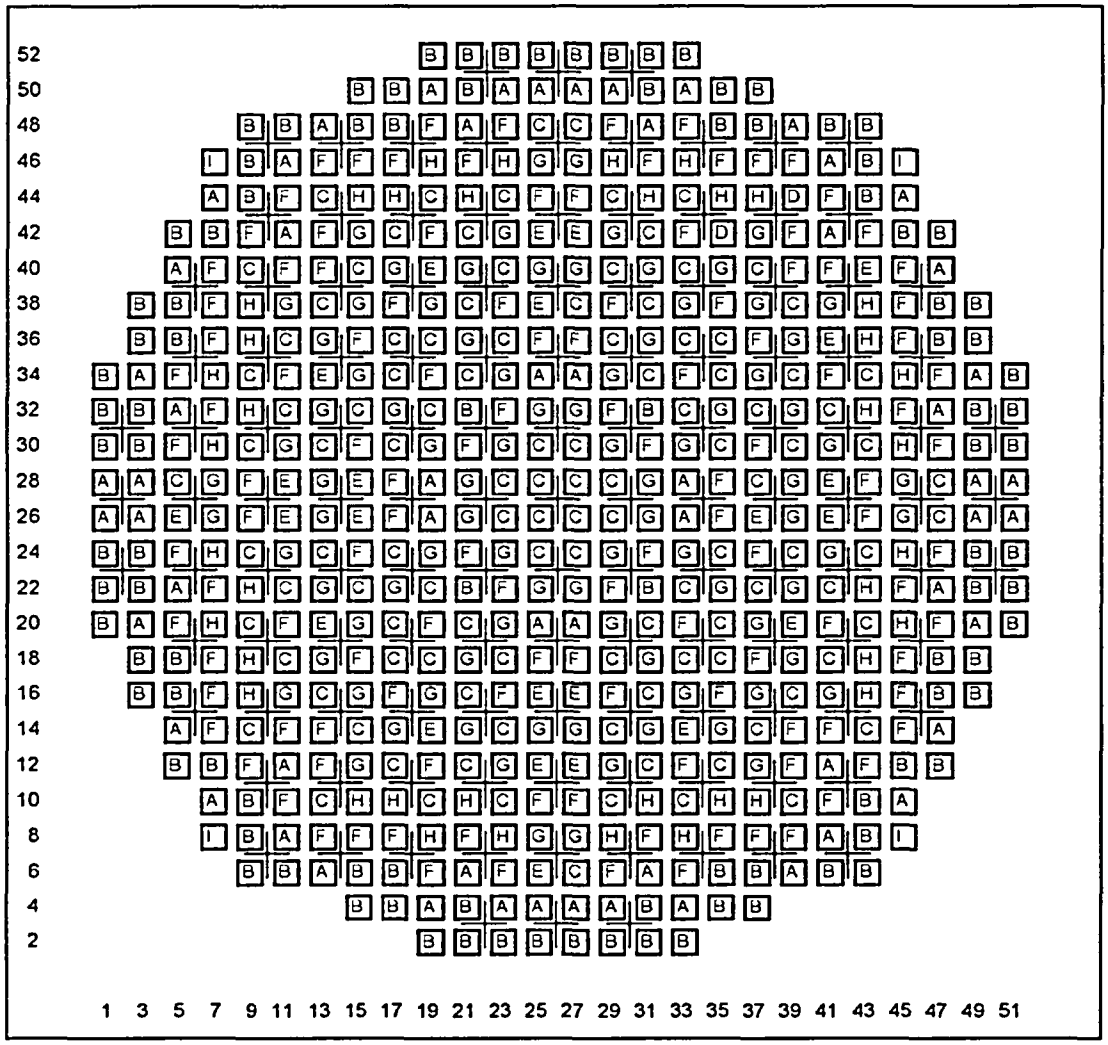
Core flow rate	[[ ]]
GEXL R-factor	[[ ]]
Random effective TIP reading	[[ ]]

Table 3

Monte Carlo Calculated DLO SLMCPR vs. Estimate by Component Parameter

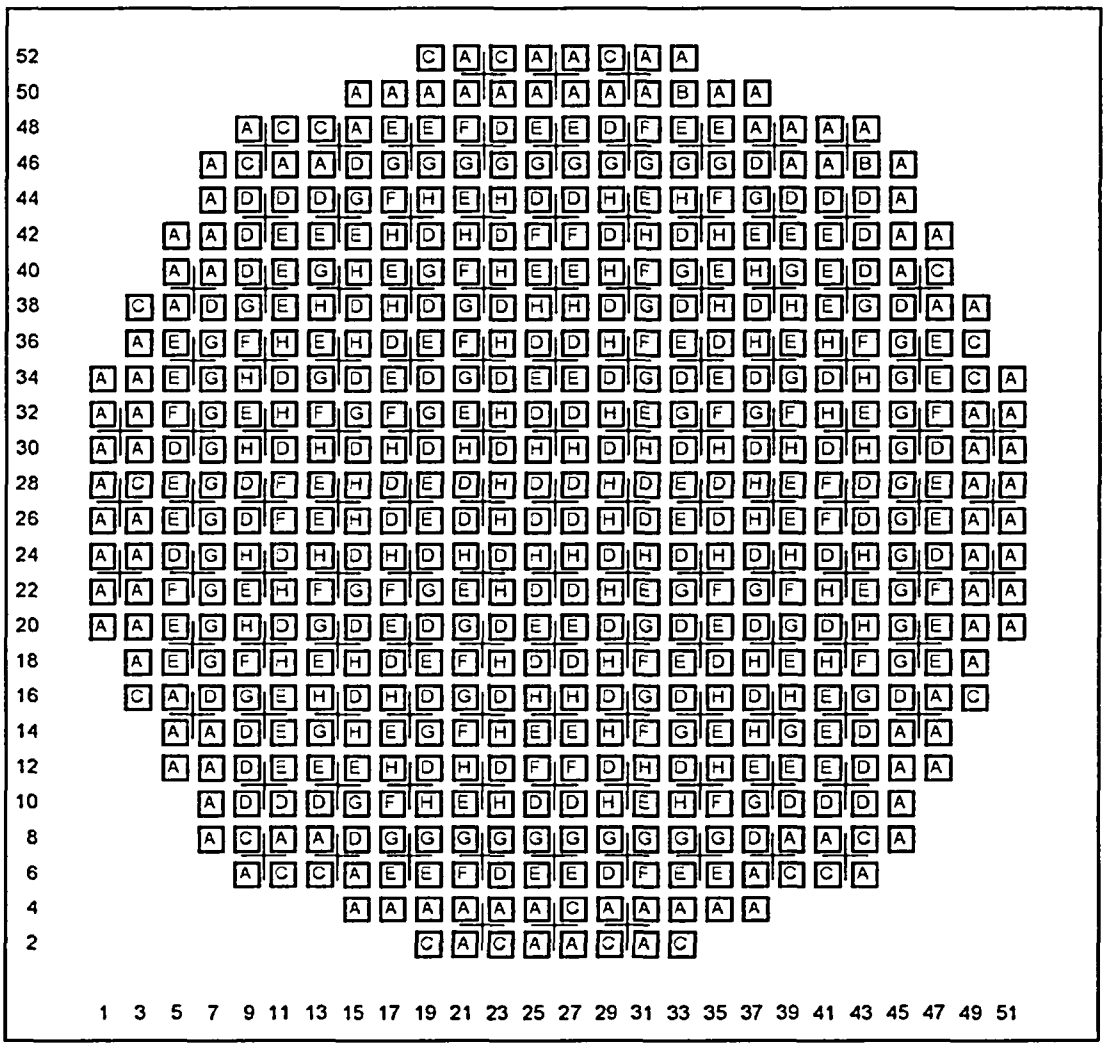
Component Parameter	Cooper Cycle 22 100%Flow	Cooper Cycle 22 75%Flow	Cooper Cycle 23 75%Flow
Power uncertainties used for Correlation	GETAB	Revised Methodology/ Reduced Power	GETAB
Base SLMCPR Estimate – Using Correlation	[[		]]
Core Flow rateand Random effective TIP reading Uncertainty Increase	N/A	[[	]]
GEXL R-factor Uncertainty Increase from [[ ]]	N/A	[[	]]
Total Estimated SLMCPR	[[		]]
Calculated SLMCPR	[[		]]
Calculated – Estimated Delta	[[		]]

Figure 1
Reference Loading Pattern – Cooper Nuclear Station Cycle 22



Code	Bundle Name	Number Loaded	Cycle Loaded
A	GE9B-P8DWB350-10GZ-80U-150-T	60	19
B	GE9B-P8DWB350-10GZ1-80U-150-T	100	19
C	GE14-P10HNAB385-14GZ-100T-148-T	110	20
D	GE14-P10HNAB385-14GZ-100T-148-T	2	20
E	GE14-P10HNAB385-14GZ-100T-148-T	24	20
F	GE14-P10HNAB379-17GZ-100T-150-T-2472	120	21
G	GE14-P10DNAB393-17GZ-100T-150-T-2610	88	22
H	GE14-P10DNAB398-16GZ-100T-150-T-2568	40	22
I	GE9B-P8DWB350-10GZ-80U-150-T	4	18

Figure 2
Reference Loading Pattern – Cooper Nuclear Station Cycle 23



Code	Bundle Name	Number Loaded	Cycle Loaded
A	GE14-P10HNAB385-14GZ-100T-148-T6-3881	110	20
B	GE14-P10HNAB385-14GZ-100T-148-T6-3881	2	20
C	GE14-P10HNAB385-14GZ-100T-148-T6-3881	24	20
D	GE14-P10HNAB379-17GZ-100T-150-T6-2476	120	21
E	GE14-P10DNAB393-17GZ-100T-150-T6-2611	88	22
F	GE14-P10DNAB398-16GZ-100T-150-T6-2569	40	22
G	GE14-P10DNAB395-14GZ-100T-150-T6-2800	76	23
H	GE14-P10DNAB393-17GZ-100T-150-T6-2801	88	23